REMARKS

Applicants' attorney thanks the Examiner for his comments. This Amendment is being filed along with a Request For Continued Examination, a Petition For One-Month Extension Of Time with fee, and a Declaration Of Patrick T. Rigney submitted under 37 C.F.R. § 1.132.

Claims 1-51 have been canceled and replaced with new Claims 52-71. Independent Claims 52, 66 and 70 are all directed to strapping which has been molecularly oriented by stretching in a longitudinal direction of the strapping, having a width of 0.5-3 cm and a thickness of 0.03-0.20 cm.

Independent Claims 52, 66 and 70 require the strapping to include about 97.2-99.8% by weight polyester. Claim 70 further characterizes the polyester as being selected from the group consisting of polyethylene terephthalate, polybutylene terephthalate, polyethylene naphthalate, polyethylene isophthalate, and combinations thereof.

Independent Claims 52, 66 and 70 require the strapping to include about 0.2-2.8% by weight of one or more polyolefins selected from the group consisting of linear low density polyethylene, branched low density polyethylene, high density polyethylene, polypropylene, and combinations thereof. Claim 52 further characterizes the polyolefin as chemically unmodified (specification, p. 4 lines 14-21). Claims 66 and 70 further characterize the polyolefins as non-reactive (specification, p. 3 lines 5-7). All claims recite that the polyolefin causes the strapping to have increased resistance to splitting in the longitudinal direction (specification, p. 1 lines 2-4, p. 2 lines 10-11, p. 4 lines 14-16).

The enclosed Declaration of Dr. Patrick T. Rigney verifies the performance of the invention. As explained by Dr. Rigney, polyester strapping having the claimed molecular orientation and dimensions is often used in heavy duty industrial applications that place the strapping under tension and cause unwanted splitting in the longitudinal direction (Rigney Dec., ¶ 3). The

inventors discovered that combining the polyester with about 0.2-2.8% by weight of an unmodified polyolefin increases the resistance of polyester strapping to longitudinal splitting relative to polyester alone. This result is surprising and unexpected because polyolefins are known to be thermodynamically incompatible with polyesters, and do not mix or disperse very well in polyesters. An expected result of mixing the incompatible polymers would be an increase in longitudinal splitting, instead of a decrease (Rigney Dec., ¶ 4).

Tests were performed using a polypropylene (PP) and linear low density polyethylene (LLDPE) as the polyolefin additives, and recycled polyethylene terephthalate (PET) as the polyester (Rigney Dec., ¶ 6).

When PP was used as the additive, the longitudinal splitting in both welded and unwelded areas diminished and disappeared at additive levels higher than 0.5% by weight (Rigney Dec., ¶¶ 8-9). However, the weld strength diminished substantially at additive levels of 2.8% by weight and higher. Without sufficient weld strength, the polyester strapping would be inoperable for its intended uses (Rigney Dec., ¶ 9). The overall data supports the claimed range of about 0.2-2.8% by weight for the PP additive, and suggests that PP levels of about 1.5-2.0% by weight are optional (Rigney Dec., ¶ 9).

When LLDPE was used as the additive, the longitudinal splitting in the unwelded areas of the strapping diminished and disappeared at additive levels above 0.5% by weight. The longitudinal splitting in the welded areas diminished at additive levels above 0.5% by weight, but did not disappear until the additive level reached 2.0% by weight or higher (Rigney Dec., ¶¶ 10-11). However, the weld strength diminished substantially at additive levels of 2.8% by weight (Rigney Dec., ¶ 11). The overall data supports a broad range of about 0.2%-2.8% by weight for the LLDPE additive, and suggests an optimal additive level of about 2.0% by weight (Rigney Dec., ¶ 11).

A showing of unexpected results can overcome a presumption of obviousness over the prior art. This is especially true where a claimed range overlaps a broader prior art range, and the claimed range produces results that are new and unexpected. *Ormco Corp. v. Orthodontic Appliances, Inc.*, 463 F.3d 1299, 1311, 79 USPQ 2d 1931 (Fed. Cir. 2006); *Iron Grip Barbell Co., Inc. v. York Barbell Co., Inc.*, 392 F.3d 1317, 1322, 73 USPQ 2d 1225 (Fed. Cir. 2004); *In Re Geisler*, 116 F.3d 1465, 1469, 43 USPQ 2d 1362 (Fed. Cir. 1997). The Rigney Declaration is submitted as evidence that the claimed narrow range of polyolefin additive produces new and unexpected results in molecularly oriented polyester strapping having the claimed dimensions, by increasing the resistance to longitudinal splitting.

a) Claim Rejection Under 35 U.S.C. § 103(a) Based on Perez

The Examiner rejected Claims 31, 33-35, 37-39, 44-45, 47 and 49-51 under 35 U.S.C. § 103(a) as obvious over U.S. Patent 6,331,343 to Perez. These claimes have been canceled. This rejection is respectfully traversed to the extent that it may be applied to new Claims 52-71.

Perez is directed to fibers and fibrillated articles provided by imparting fluid energy to at least one surface of a highly oriented, voided, melt processed polymeric film (Abstract). The films are formed from an immiscible mixture of a semicrystalline polymer component and a void-initiating component. The film is stretched along at least a first axis to impart a voided morphology, and may be further stretched along a second axis. The oriented film is then fibrillated by imparting sufficient fluid energy (Col. 2 lines 1-24).

The oriented film used to form the fibers and fibrillated articles can be formed from an immiscible polymer blend including a semicrystalline polymer and a void initiating polymer present in weight ratios of 99:1 to 1:99 (Col. 4 lines 46-55). The components and processing conditions are selected so as to render the film amenable to fibrillation (Col. 5 lines 27-30 and 41-43). Importantly, the limited solubility of the two polymers and a free energy of

mixing greater than zero facilitate the formation of voids needed for subsequent fibrillation (Col. 6 lines 1-5).

Perez teaches that fibrillation of the film is enhanced by imparting voids in excess of 5%. Perez further teaches that films formed from the incompatible polymers which lack sufficient voids for fibrillation may nevertheless be split longitudinally (Col. 8 lines 50-64). Thus, the overriding principle of Perez is to use incompatible polymers to form a film that can be easily split, and process the film in such fashion that the film is split not once or twice, but numerous times to form small fibers.

Perez discloses a laundry list of semicrystalline polymers, including polyolefins among many others (Col. 3 lines 15-36). Perez discloses a laundry list of void-initiating polymers, including polyester among many others (Col. 4 lines 28-45). Yet to the extent Perez might lead a person of ordinary skill in the art to combine a polyolefin with a polyester, it would so motivate that person to use ingredient amounts and processing conditions that manufacture a longitudinally splittable, fibrillatable film. Perez does not motivate persons skilled in the art to combine polyolefins with polyester using ingredient amounts and conditions that *diminish or defeat* longitudinally splitting, or reduce the frequency of splitting to less than that of polyester alone.

Referring to Applicant's independent Claims 52, 66 and 70, Perez does not disclose adding about 0.2-2.8% by weight of a chemically unmodified or non-reactive polyolefin to polyester so as to *increase the resistance of the strapping to splitting in the longitudinal direction.* This is a surprising and unexpected result which, for practical purposes, is achieved only within the claimed range of polyolefin. When the level of polyolefin is less than about 0.2%, the strapping splits longitudinally with the same frequency as pure polyester strapping, and no improvement is noticed (Rigney Dec., ¶¶ 8-11, Tables 1-4). When the level of polyolefin is greater than about 2.8% by

weight, the weld strength of the strapping is compromised to the extent that the strapping becomes inoperable for its intended heavy duty applications (Rigney Dec., ¶¶ 9 and 11). Depending on the type of polyolefin and polyester, the optimum level of polyolefin may vary within the claimed range. Yet the data plainly show that the claimed narrow range of about 0.2-2.8% by weight polyolefin reduces or eliminates the incidence of longitudinal splitting, contrary to the teaching of Perez.

Even though the claimed range of about 0.2-28% by weight of polyolefin overlaps a much broader range of 1-99% by weight polyolefin taught by Perez, the claimed increased *resistance* to longitudinal splitting is contrary and opposite to the result taught by Perez. Perez teaches away from the claimed result. Under these circumstances, the surprising and unexpected result achieved and claimed by Applicants is sufficient to overcome the presumption of obviousness. *Ormco Corp.*, 463 F.3d at 1311; *Iron Grip Barbell Co.*, 392 F.3d at 1322; *In Re Geisler*, 116 F.3d at 1469. Accordingly, the claim rejection based on Perez should be withdrawn.

b) Claim Rejection Under 35 U.S.C. § 103(a) Based on Perez in View of Nishimura

The Examiner rejected Claims 31-51 under 35 U.S.C. § 103(a) as obvious over Perez in view of U.S. Patent 5,607,183 to Nishimura. These claims have been canceled. The rejection is respectfully traversed to the extent that it may be applied to new Claim 52-71.

The foregoing discussion of Perez is applicable to this rejection, and is incorporated by referenced. Nishimura is cited as disclosing reinforcing belts that comprise polyesters such as polybutylene terephthalate, polyethylene naphthalate or polyethylene isophthalate. However, Nishimura does not overcome the deficiencies in the Perez disclosure. The disclosed polyesters are not mixed with a polyolefin additive (Col. 14 lines 17-49). Also, the disclosed belts are formed of woven fabrics which, in turn, are formed from small fibers

instead of straps having the claimed dimensions (Col. 3 lines 29-37, Col. 4 lines 33-41, Col. 13 lines 45-57). The combination of Perez and Nishimura does not disclose or suggest Applicants' claimed invention, and this rejection under 35 U.S.C. § 103(a) should be withdrawn.

In both the instant rejection and the preceding one, the Examiner admits that Perez does not disclose a polyester strapping material that has both a width of 0.5-3 cm and a thickness of 0.03-0.20 cm, yet refuses to attribute any significance to these limitations. The dimensional limitations define the claims in a way that is commensurate with the scope of Applicants' discovery. Applicants have only tested the claimed composition using molecularly oriented strapping having dimensions within the claimed ranges. Applicants have not tested the composition using thin, wide voided films as disclosed in Perez, or woven belts as disclosed in Nishimura. Applicants are thus not in a position to state how the claimed composition would affect the thin, wide voided films of Perez or the woven belts of Nishimura.

However the reverse is also true. Just as Applicants are in no position to claim thin, wide voided films or woven belts (thus disregarding the dimensional limitations of what was discovered), the Examiner is also in no position to disregard Applicants' dimensional limitations. The Examiner is in no position to state that whatever happens with thin, wide voided films or woven belts would apply to molecularly oriented strapping having the claimed dimensions. The prior art speaks for itself in this regard. Whereas Perez teaches using incompatible polymers to induce longitudinal splitting and fibrillation of thin, wide voided films, Applicants have discovered a precise combination of incompatible polymers having precisely the opposite effect on molecularly oriented strapping having the claimed dimensions.

Under these circumstances, it is not proper for the Examiner to disregard the dimensional limitations. The improved resistance to longitudinal splitting may arise from the claimed polymer combination alone, or the claimed

dimensions of strapping may be needed to display these benefits. Given the uncertainty as to what causes this surprising and unexpected improvement, the dimensional limitations have been properly included in the claims, and should not be off-handedly dismissed as insignificant. That the prior art does not disclose these dimensions is all the more reason to doubt the applicability of the prior art, and to withdraw the obviousness rejections over Perez and Nishimura.

c) Claim Rejection Under 35 U.S.C. § 103(a) Based on Perez in View of Steinkamp

The Examiner rejected Claims 43 and 46 under 35 U.S.C. § 103(a) as obvious over Perez in view of U.S. Patent 6,331,343 to Steinkamp. Claims 43 and 46 have been canceled. This rejection is respectfully traversed insofar as it may be applied to new Claims 52-71.

The foregoing discussion of Perez is applicable to this rejection, and is incorporated by reference. Steinkamp is cited as discloing polyolefin grafted with a polar monomer such as maleic anhydride or acrylic acid. The disclosure of Steinkamp does not strengthen the rejection of the independent claims based on Perez alone because Applicants' independent claims require the polyolefin to be chemically unmodified (Claim 52) or non-reactive (Claims 66 and 70). Grafting a polyolefin with a polar monomer would impart both chemical modification and reactivity. Accordingly, this rejection should be withdrawn for the same reasons as the rejection based on Perez alone.

d) Further Reply to Examiner's Response to Arguments

As explained above, the prior art cited by the Examiner does not disclose the geometric limitations of Applicants' claims, namely a) strapping which has been longitudinally molecularly oriented, b) having a width of 0.5-3 cm, and c) a thickness of 0.03-0.20 cm. The prior art also does not disclose the inclusion of about 0.2-2.8% by weight of a polyolefin which causes the strapping to have increased resistance to splitting in the longitudinal direction.

The Examiner recognizes that Perez discloses combinations of polyester and polyolefins having overlapping weight ratios of 99:1 to 1:99. The Examiner argues that Perez teaches fibrillation during orientation, but may nevertheless show increased resistance to longitudinal splitting during normal use when the polyolefin is used at low levels approaching 1% by weight (Office Action, pp. 8-9).

Yet the fibrillation and splitting taught by Perez not only occurs during orientation, but also during subsequent processing. As stated at Col. 8 lines 60-64 of Perez:

> It has been found that an oriented film lacking in significant amount of voids is not readily fibrillated, even though the film may be split longitudinally, as is characteristic of highly oriented polymer films having a fibrous morphology (Col. 8 lines 60-64).

Thus, Perez teaches that films formed of incompatible polymers *which have already been oriented* are characterized by longitudinal splitting during subsequent use. Moreover, Perez teaches that subsequent fibrillation may be induced by hydraulic energy or mechanical needles (Col. 9 lines 50-59). It is further apparent that Perez is relying on incompatible polymer blends to achieve a degree of longitudinal splitting and fibrillation that cannot be achieved using either polymer alone.

Applicants' invention, by contrast, is directed to strapping formed from a blend of polyester with about 0.2-2.8% by weight polyolefin, that exhibits *increased resistance* to longitudinal splitting compared to polyester alone (Rigney Dec., ¶¶ 8-11, Tables 1-4). During testing, attempts are made to longitudinally split the strapping by driving a sharp penetrator tip through the strapping. If the penetrator tip causes a puncture and nothing more, no split is recorded. If the penetrator causes a longitudinal split around the puncture, then a split is recorded (Rigney Dec., ¶ 7). Put another way, mechanical hole punching is disclosed in Perez as one way to cause longitudinal splitting and

fibrillation (Col. 9 lines 50-59). Applicants use an analogous (albeit different) mechanical hole punching test to demonstrate greater *resistance* to longitudinal splitting resulting from the invention.

When a claimed narrow range of composition overlaps a much broader prior art range of composition, the claimed composition is rendered patentable if *either* a) the prior art teaches away from the claimed range *or* b) the claimed range produces new and unexpected results. *Ormco Corp.*, 463 F.3d at 1311; *Iron Grip Barbell Co.*, 392 F.3d at 1322; *In Re Geisler*, 116 F.3d at 1469. Perez teaches away from the claimed invention by teaching the use of incompatible polymer blends only to *facilitate* longitudinal splitting and fibrillation, which is opposite the result recited in Applicants' claims. Moreover, for the reasons explained in the Rigney Declaration, the claimed invention plainly produces a new and unexpected result of *increased resistance* to longitudinal splitting resulting from the claimed narrow range of incompatible polymer blends.

e) Conclusion

Applicants believe that the claims are in condition for allowance. If the Examiner detects any unresolved issues, Applicants' attorney respectfully requests a telephone call and a telephone interview. Applicants respectfully request reconsideration and withdrawal of the claim rejections under 35 U.S.C. § 103(a).

Respectfully submitted,

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